

## **PLANT PROTECTION SECTION**

The Plant Protection Section is responsible for implementing laws enacted by the North Carolina General Assembly to protect North Carolina agriculture and its citizens from the entry, establishment, release, and spread of injurious organisms into or within North Carolina.

The mission of the Plant Protection Section is to enhance the quality of life in North Carolina by protecting agriculture and the environment from injurious plant pests, by promoting beneficial organisms, and by protecting rare native plants of the state.

We serve the people of North Carolina by:

- Protecting agricultural crops, horticultural crops and native flora, by preventing or controlling the invasion and spread of injurious insects, plant pathogens, weeds, and other pests of regulatory concern.
- Protecting honey bees by combating the spread of bee pathogens.
- Responding to constantly changing threats to crops, rare native plants, and honey bees by drafting effective and reasonable regulations and by achieving public compliance.
- Supporting agriculture, horticulture and related industries by providing inspection and export services to facilitate the movement of regulated commodities.
- Protecting rare native plants by restoring their habitats, and by propagating and restoring them to the wild.
- Promoting beneficial organisms that serve as biological controls of pest species.
- Providing outstanding service and satisfaction to all our clients.

North Carolina has an extremely wide range of climate, from near tropical along the southeast coast to winter conditions similar to southern Canada in our higher mountains in the west. Such diversity provides suitable environments for an extremely diverse flora and fauna. Extensive international air and sea transportation, both military and commercial, and an extensive Interstate Highway System increase the potential for the accidental introduction of pest organisms into North Carolina. Therefore, North Carolina's Plant Protection Section programs must deal with a wide range of organisms and host-pest interactions.

Major program activities for 2005 included the following:

### **Apiary Inspection Program**

Relative to the 2004 spring, bees over-wintered well in 2005. Spring buildup was good and weather appeared to be favorable for a good honey flow. Unfortunately, this was realized only early in the season and later on turned out not to be the case. Those beekeepers depending on the sourwood honey crop were for the most part disappointed. The bees of the coastal plain seemed to fair better throughout the season than those of the piedmont and the mountains.

For the 2005 season, there was a general shortage of colonies for pollination. North Carolina Department of Agriculture and Consumer Services (NCDA&CS) in cooperation with North Carolina State University (NCSU) have provided a web site to assist in matching pollinators with growers. This program is in its infancy and will be further developed through more promotional and educational efforts with the growers.

The Varroa mite continued to be a major threat to the beekeeping industry in North Carolina. There have been several new products registered for use in controlling this pest. However, the mites continue to develop resistance to some of these materials relatively quickly making it difficult to maintain the efficacy of these products. Another difficulty is the growing use of unregistered materials that may or may not be effective. Further, the improper use of antibiotics can further complicate useful treatment regimes.

NCDA&CS continues to enjoy a good working relationship with NCSU staff. We have had the opportunity to assist them in some of their projects and would like to express our gratitude for their assistance in many of our projects.

The NCDA&CS Apiary Program field staff continues to assist the beekeepers through field inspections, educational meetings, and field days, and to make every attempt to be available to assist the beekeepers in any way necessary. The primary goal is to continue to improve our overall inspections and in particular our documentation of them. Our ultimate goal is to reduce the rate of honeybee disease and pest problems. For 2005, there were 8,983 colonies inspected. Of these, 40 hives were documented to have American Foulbrood.

## **Biological Control Programs**

Biological Control Program activities remain focused primarily on exotic pests including the cereal leaf beetle, gypsy moth, *Harmonia axyridis*, hemlock woolly adelgid, and imported fire ant. Following are brief summaries of these projects.

### **Cereal Leaf Beetle**

One insectary to rear parasitoids of *Oulema melanopus*, a pest of small grains, was operated at Salisbury during 2005. For the fifth year, larvae parasitized by *Diaparsis temporalis* were found at Salisbury. The insectary now contains the aforementioned species and *Tetrastichus julis*, as well as the egg parasitoid, *Anaphes flavipes*. Cereal leaf beetle larvae parasitized by *T. julis* and *D. temporalis* were released in a field at Cherry Farm in Wayne County in an attempt to establish the parasitoids in small grains at that station.

### **Gypsy Moth**

Larvae of gypsy moth (*Lymantria dispar*) were collected in Currituck County, North Carolina and adjacent Virginia Beach, Virginia by Plant Industry personnel on June 1, 2005, and brought to the Beneficial Insects Lab (BIL) to determine the presence of nuclear polyhedrosis virus (NPV). Larvae were held in the quarantine facility individually on artificial media in 28 ml plastic cups for 15 days or the larva died, whichever came first. To confirm the presence of virus, tissue was excised from the larva, placed in a drop of water on a microscope slide and covered with a cover slip. Determination was made with a phase-contrast microscope at 100 to 400X magnification. A total of 51 larvae were collected, and 42 (82%) were infected with NPV. Thirty nine of these (93%) exhibited signs of NPV infection, that is a soft, limp body, bent at approximately 90° and fluids oozing from the cuticle. Two of the dead larvae were negative for NPV, and may have been injured in transport or handling. Surviving larvae were all large, estimated as 5th & 6th instars, and at the end of 15 days were disposed of by autoclaving.

### ***Harmonia axyridis* and other coccinellids**

Three studies were conducted on the introduced multicolored Asian lady beetle *Harmonia axyridis* during 2005.

1) Between March 3 and July 21, 2005, a survey of the coccinellids captured by pitcher plants was completed on the grounds of the Beneficial Insects Laboratory (BIL) in Cary. The collected data will be pooled with the data of previous years and analyzed.

2) A mark-recapture study was initiated on October 18, 2005, on the grounds of the BIL with the goal of determining the distance traveled between field sites and aggregation sites. A total of 2,454 beetles were marked; the study is ongoing.

3) Two light traps were run on the grounds of the BIL between April 4 and October 31, 2005, and all coccinellids collected. Starting on August 30, 2005, *Harmonia* was also collected from dog fennel (*Eupatorium capillifolium*) in a nearby field. All insects were preserved, packaged and shipped to cooperators at the State University of New York; they are studying infection patterns of the fungus *Hesperomyces virescens* on the beetle.

One paper was published in a professional journal during 2005:

Nalepa, C.A., G.G. Kennedy, and C. Brownie. 2005. Role of visual contrast in the alighting behavior of *Harmonia axyridis* (Coleoptera: Coccinellidae) at overwintering sites. *Environ. Entomol.* 34(2): 425-431.

Two posters were presented at the Annual Meeting of the Entomological Society of America in Fort Lauderdale, Florida December 15-18, 2005:

“Infection of *Harmonia axyridis* by *Hesperomyces virescens*: Role of Mating Status and Mating Behavior” by C.A. Nalepa and A. Weir

“Infection of *Harmonia axyridis* (Coleoptera: Coccinellidae) by *Hesperomyces virescens*: Pattern of Infection during the Mating/Feeding Season” by Fang Zhou, Christine Nalepa and Alex Weir

### **Hemlock Woolly Adelgid**

A native of Asia, this pest attacks hemlock trees, settling onto branches and sucking sap from the base of the needles. Widespread infestations have been found in North Carolina, in a variety of situations from specimen trees in landscapes to large stands in natural areas. Since chemical treatment is so difficult, a biological control program is being initiated in cooperation with the United States Department of Agriculture, Forest Service (USDA FS) and the United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA APHIS). An insectary was established in our Cary lab in 2002, to rear a small predatory beetle, *Sasajiscymnus tsugae* (= *Pseudoscyrnus tsugae*), a host-specific predator. The operation has expanded each year. About 44,000 beetles were turned over to the Forest Service for release at selected sites during 2005. Plans call for rearing 50-80,000 beetles in the coming year.

## **Imported Fire Ant**

The phorid fly *Pseudacteon curvatus* was released in Wake County over a two-week period in April 2005. Ants were collected from mounds and sent to the United States Department of Agriculture, Animal and Plant Health Inspection Service, Center for Plant Health Science and Technology (USDA APHIS CPHST) lab in Gainesville, Florida to be exposed to the parasitic flies. An estimated 13,000 parasitized ants were returned to their mounds. Staff began to monitor mounds for the presence of the fly about 30 days after the first day of the initial phorid fly release. The first generation of flies was recovered 36 days after the first date of release. A total of six generations were recovered through December, and flies were found approximately ¼ mile from release mounds. Monitoring will resume in spring 2006 when temperatures return to an average of 70°. The previous release sites in Wayne, Duplin and Robeson Counties were monitored during the fall, but no flies were collected at any of the sites.

## **Cooperative Agriculture Pest Survey (CAPS) Program**

The Cooperative Agricultural Pest Survey (CAPS) is a joint initiative between the USDA APHIS PPQ and the NCDA&CS to fund and implement domestic surveys of harmful or economically significant plant pests and weeds that have not been detected by front-line inspections at our ports of entry. These surveys are necessary to safeguard our nation's agricultural and natural resources by detecting early pest infestations or introductions which validates our trading partners concerns for pest status. Typical surveys target exotic pests, pests of export significance and pests that are not known to occur in the U.S., but can also include regionally established pests. A strong domestic pest detection infrastructure and headquarters/regional staff is vital to ensuring that scientifically valid, current, and reliable pest/disease survey data is available on a continuing basis. Additionally, staff support is also critical at the state level and federal funding provided for a State CAPS Survey Coordinator position to be housed within the NCDA&CS Plant Industry Plant Protection Section.

The State CAPS Committee met three times during the year. Initially, the committee met on February 5th to plan this year's activities, on June 15<sup>th</sup> for a mid-year report and September 22nd to plan for FY 2006. To assist in preparation of field surveys, Dr. Ken Ahlstrom attended the Eastern Region CAPS Meeting during November in Charleston, South Carolina.

## **Summary of 2005 Core Project Surveys**

### **Dogwood Anthracnose**

Dogwood Anthracnose is a disease of both the native and ornamental cultivars of flowering dogwood. It has been causing widespread mortality of dogwood in the northeastern U.S. since the mid 1970's. In 1987, the disease was confirmed in western North Carolina and northern Georgia. It is now confirmed in 24 western North Carolina counties. The North Carolina Forest Service (NCFS) has established and maintains 40 impact plots in infested counties and monitors them on a yearly basis. Approximately 56% of the dogwoods present on the original 40 plots have died from dogwood anthracnose infections. The purpose of this project (no federal funds, only data collection) is to continue monitoring tree status on the original 40 impact plots and to

establish additional plots on the leading edge of the infected area to determine rate of spread. In summary, the NCFS noted that for this season, 29 counties were positive for the disease.

### **Oak Wilt Survey**

Oak Wilt is the most serious fungus disease affecting oaks. It is currently found in 20 states. North Carolina has a history of oak wilt dating from 1951. Since that year, a progressive program has been initiated each year to locate and eradicate all confirmed oak wilt trees. The disease is primarily confined to five western North Carolina counties. The annual aerial/ground survey of positive and adjoining counties has helped to isolate, monitor, and document the presence of the disease for oak log exporting concerns. The purpose of this survey is to continue aerial and ground surveys to determine the distribution of Oak Wilt disease in affected and adjoining counties. Further, the NCFS will conduct eradication/suppression activities on those oak trees with laboratory confirmed oak wilt. Finally, the NCFS will document the location of active oak wilt centers.

## **Summary of 2005 Exotic Pest Survey Projects**

### **Wood Boring/Bark Beetle Survey**

Although this survey is conducted primarily by USDA PPQ personnel, NCDA&CS Field Specialists were alerted, as part of their survey activities, to be on the watch for the Asian Longhorned Beetle, Emerald Ash Borer, and the Japanese Cedar Longhorned Beetle in Dare County. None were detected.

### **Exotic Pest Detection**

#### ***Inula britannica***

*Inula britannica* L. is a rhizomatous perennial or biennial of the aster family. Native to Europe and Asia, it is now widespread in the Palearctic Region, occurring from Spain to Japan and north to Scandinavia and Siberia. It occurs primarily in moist habitats including ditches, stream banks, wet woods, and moist meadows. It has become an aggressive weed in field grown hostas in the Netherlands and has been introduced into North America. It has the potential to become a serious weed pest in the United States. It has been found at several Hosta nurseries in Michigan and was detected in hosta plants in Wilson County in 2000-01. Eradication measures were conducted and no further detections have occurred.

The objective of this project was to determine the presence or absence of *Inula* in Hosta plant material in North Carolina. The approach was to utilize existing NCDA&CS field personnel to survey for *Inula* as part of their routine nursery and nursery dealer inspections. For this season, these surveys detected no *Inula* in the state.

To follow-up, an informational brochure highlighting *Inula* was completed and distributed to all certified and registered nurseries in the state. In addition, concerned individuals have been given the brochure upon request.

### **Malaise trapping for overseas pests**

With numerous military facilities located in North Carolina and with the current state of affairs globally, exotic pests could easily be transported on military equipment returning to the United States from overseas.

The purpose of this project was to set up Malaise traps with an alcohol-collecting head at three military sites in North Carolina to determine if exotic pests could be found hitchhiking on military cargo returning from overseas. Traps were set at Military Ocean Terminal Sunny Point in Brunswick County, Camp Lejeune in Onslow County, and Pope Air Force Base in Cumberland County. Traps were monitored weekly and alcohol bottles collected. No exotics were found.

### **Snail and Slug Survey**

There are numerous pathways now present for the introduction of new plant pests, including snails and slugs. Many of these are or could be moderate to serious pests of agricultural crops. In addition, some are known to carry diseases that affect humans as well as livestock.

The purpose of the outlined survey was to determine the presence of possible new snail introductions in North Carolina. All specimen collected were to be sent to the proper authorities for inclusion in the DNA analysis program of the North American Slug Project. Some surveys during the summer were accomplished by a part-time technician assisting the State Survey Coordinator. Surveys to familiarize the technician with procedures were for collecting snails and slugs at local nurseries. Surveys were conducted at the Malaise traps sites described above by the State Survey Coordinator and the technician. No suspect specimens were encountered.

In addition, USDA APHIS PPQ conducted surveys at several commercial sites dealing with tile imports. No suspect snails or slugs were found.

NCDA&CS field specialists were requested to survey for snails and slugs as a component part of their nursery/nursery dealer inspections. In North Carolina, there are approximately 1,800 nurseries and nearly 2,300 nursery dealers. At present, no snails or slugs had been collected by field personnel.

### **Pink Hibiscus Mealybug**

Pink Hibiscus Mealybug is a serious threat to agriculture in the U.S. because it can attack over 200 plants. In North Carolina, hosts include: corn, cotton, cucumber, grape, hibiscus, okra, peanuts, pumpkin, rose, and soybeans.

NCDA&CS field specialists were requested to visually survey for pink hibiscus mealybug as a component part of their nursery/nursery dealer inspections. At the current time, no detections of this serious pest were found.

### **Fruit Tree Tortrix Moth**

This moth pest is currently established in British Columbia and was trapped in Washington state. In North Carolina, this moth has the potential to be damaging to fruit of apples, plums, and blueberries. In addition, this moth is capable of feeding on many forest and ornamental trees including maple, oak, elm, walnut, birch, hawthorn, and many others. Wing traps were placed in abandoned apple orchards in three western counties and were monitored monthly during the summer. No Fruit Tree Tortrix Moths adults were detected.

### **Summer Fruit Tortrix Moth**

This moth pest has two generations per year and is a serious pest of apples, pears, and peaches. The first generation larvae feed on leaves and flowers of host plants with adult emergence occurring in June. Second generation larvae feed on the fruit. Adult emergence occurs in August. At the present time this moth is not present in the U.S. Wing traps were placed in abandoned apple orchards in three western counties and were monitored monthly during the summer. No Summer Fruit Tortrix Moths adults were detected.

### **Light Brown Apple Moth**

This moth is a highly polyphagous pest of over 120 plant genera in over 50 families with a preference for hosts in the Compositae, Leguminosae, Polygonaceae, and Rosaceae. Some host plants are: apple, blueberry, camellia, grape, oak, persimmon, pine, potato, strawberry, and viburnum. While this pest has been intercepted at several ports of entry in the United States, it has failed to become established. Wing traps were placed in abandoned apple orchards in three western counties and were monitored monthly during the summer. No Light Brown Apple Moth adults were detected.

### **Viburnum Leaf Beetle**

The Viburnum Leaf Beetle is a serious pest of viburnum, a valuable landscape plant. Heavy infestations can defoliate shrubs, cause dieback, and eventually kill the plant. The beetle's known range is Ohio, Pennsylvania, New York, Vermont, New Hampshire, Massachusetts, and Connecticut. Visual surveys were conducted at nurseries selling viburnum in three northwestern counties in North Carolina. No Viburnum Leaf Beetles were detected.

### **Soybean Aphid**

Soybean Aphid is a recently introduced pest of soybeans in the United States. Originally, a native of China and Japan, it was first identified in the U.S. in the summer and fall of 2000 in several Midwestern states. Like most aphids it is able to build high populations in a short period of time. Infestations that peak at the bloom stage can stunt the plants producing fewer pods, thereby lowering yields. Currently, this aphid is the only one in North America capable of developing large populations on soybeans. It has been detected in Virginia counties bordering North Carolina. Visual surveys were conducted in northeastern North Carolina. Soybean aphid was detected in soybean fields in Camden, Currituck, and Gates Counties.

## Noxious Weeds

The primary objectives for the noxious weeds survey component included:

- \*Continuing to conduct eradication efforts against noxious weeds in the state.
- \*Containing, reducing, or eliminating all known populations of these species in the state.
- \*Conduct intensive delimiting and detection surveys around the four sites of naturalized Giant Salvinia in eastern North Carolina.
- \*Conducting a public awareness campaign to inform water managers, wildlife officers, and licensed aquatic applicators about Giant Salvinia.
- \*Conducting surveys to determine the distribution of Tropical Soda Apple in North Carolina and to delimit infestations where found.
- \*Conduct surveys at the Cherry Farm, Wayne County and elsewhere in North Carolina to determine the extent of Tropical Spiderwort in the state.

To meet the objectives noted above, aquatic plant dealers throughout North Carolina were surveyed during the reported period for the presence of prohibited noxious weeds. No noxious aquatic weeds were reported in 2005. During the reporting period, the 30-acre wetland site near Burgaw, Pender County, where Giant Salvinia was first detected in 2000, was thoroughly surveyed and the boundaries of this infestation were found to have remained stable since 2004. The infestation appears not to have spread downstream from the site. Additional sites in Craven, Onslow, and New Hanover Counties were monitored. Agency personnel participated in the Northeast Cape Fear Giant Salvinia Task Force, which was organized in 2002. Further detection and delimiting surveys will be conducted throughout eastern North Carolina in 2006.

Surveys for the Federal Noxious Weed, Tropical Spiderwort continued at the Cherry Research Farm, Wayne County, North Carolina. The weed continued to expand at this site, but has not been found on adjacent properties. Extensive surveys throughout the state in 2005 detected Tropical Spiderwort in Sampson, Wake, and Washington Counties. It was also found at a nursery in Brunswick County, but was not considered to be established at that site. Single plants were found at nursery dealers in Garner and Clinton. A Tropical Spiderwort Advisory Committee was developed and continues to meet and develop plans for both eradication and regulatory activities for 2006.

Eradication efforts continued with Purple Loosestrife in Davidson, Forsyth, Mitchell, Onslow, and Washington Counties. Purple loosestrife persists at one site near Spruce Pine in Mitchell County, where eight plants were treated with Garlon 3A herbicide and at a second site at Bass Lake in Watauga County where more than 100 plants were treated with Rodeo herbicide. New sites consisting of ten or fewer plants each were detected in Alleghany, Ashe, Mitchell, and Watauga Counties. All purple loosestrife plants found at these new sites were treated with herbicide or rogued and destroyed.

Visual surveys for Mile-a-Minute weed were conducted in western North Carolina in Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Haywood, Iredell, McDowell, Madison, Mitchell, Polk, Rutherford, Surry, Watauga, Wilkes, Yadkin, and Yancey. No Mile-a-Minute weed was found.

Survey for Puncturevine in Chowan County detected no plants in 2005.



Tropical Soda Apple (TSA) continues to occur at Martin's Abattoir and Wholesale Meats in northern Sampson County. At this site, TSA contaminated rumen contents and manure from the cattle slaughtering process are spread on nearby fields, resulting in dissemination of the weed. The infestation persists at a low level, apparently due to repeated re-introductions of TSA seed in cattle shipped to the location for slaughter. A second site was detected in 1998 on Coharie Farms pastureland in southern Sampson County. In 2005, no TSA was detected at this site. Approximately 1,000 acres were surveyed at these sites twice during the reporting period and 14 TSA plants were rogued and destroyed at the Martin's Meat site. Other locations throughout North Carolina known to have recently received cattle from Florida were surveyed with negative results. Additional surveys in Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Haywood, Iredell, McDowell, Madison, Mitchell, Polk, Rutherford, Surry, Watauga, Wilkes, Yadkin, and Yancey Counties in western North Carolina detected no Tropical Soda Apple. Survey and eradication efforts at both Sampson County sites where TSA has been found will continue in 2006.

Visual surveys for Small Broomrape were conducted in Mitchell and Yancey Counties with additional limited survey in Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Haywood, Iredell, McDowell, Madison, Polk, Rutherford, Surry, Watauga, Wilkes, and Yadkin Counties. The weed was detected only at five sites in Mitchell County near Bakersville.

## **Computer Resources**

The Plant Protection Section utilizes a full-time Applications Analyst Programmer I in support of program activities. For 2005, this position provided support in the following areas:

### **Current Program and Database Development**

1. Statewide Gypsy Moth Program: Wrote project definition, specifications and plans for moving GM version 1.2 to .NET platform. Developed new user interface to incorporate new GPS data format into database design. Moved Statewide Gypsy Moth database to Access XP.
2. Plant Conservation Permit Request Program (PRP): Written in ASP.NET with Access 2003 as the supporting database. A web enabled on-line form supporting the forms used by the Plant Protection Section in plant protection and conservation activities.
3. Witchweed Treatment and Control Program: version 1.1.14, added Manager Interface to close out season and change dates to new season. Continued maintenance of Witchweed Database. Developed and wrote project specifications and project plans for moving Witchweed to new database version and Witchweed VB 6.0 code to the new .NET Platform.
4. Fertilizer Inspector Reporting Program (FIR): Testing the move from Access 97 to Access 2003. Modify VB 6.0 code to accept new database format. Wrote project definition, specifications and plans for moving FIR version 1.2 to .NET platform. Build quarterly reports for total inspections by county and inspector.
5. Seed Inspector Reporting Program (SIR): Testing the move from Access 97 to Access 2003. Modify VB 6.0 code to accept new database format. Wrote project definition, specifications and plans for moving SIR Version 1.2 to .NET platform. Build quarterly reports for total inspections by county and inspector.

6. Seed Sample Analyses Laboratory Program will be completed in VB 6.0. Currently, writing project definition, specifications and plans for moving all Seed Sample Analyses Laboratory (SSAL) to VB.NET. The backend database is currently MS Access 2000. Will move database to Access 2003 and then to Microsoft SQL
  - Seed Sample Planting: deployed, training and documentation in process
  - Seed Sample Input and Receiving: deployed, training and documentation in process
  - Seed Sample Company, retailer, individual customers: deployed , training and documentation in process
  - Seed Sample Lookup Tables user interfaces for Kind, Variety, Genus, Species, Noxious Weed, Other Crops: deployed
  - Seed Sample Germination: Final Testing and final feature additions in process.
  - Seed Sample Reporting: Project definition and timeline in process, prototype development beginning.
  - Seed Sample-Online Tracking: Project definition in process.
7. Added new content to the Plant Industry Website as requested by NCDA&CS Plant Industry Division staff. Cleaned web space of old files no longer linked. Continued to move Word documents to PDF format. Added .pdf files that can be filled out on-line. Gathered information on the moving Plant Protection protected web site information to the departmental protected web site location.

## **Maintenance**

1. Reviewing all source code written in VB 6.0, documenting user interfaces and features as part of the plan to move all code to Microsoft .NET platform.
2. Worked with staff to continue development and training on the Witchweed Program.
3. Maintenance performed on the Gypsy Moth program
4. Support and maintenance of the old seed DOS based seed program
5. Worked with staff to update Plant Industry Website
6. Hardware and software reviews.
7. Support staff on basic software application questions

## **Research and testing**

1. Review of new database systems: MySQL 4.0, 5.0 an open source, SQLserver 2000 and SQLserver 2003
2. Review Visual Studio 2003 and Visual Studio 2005.
3. C#.NET for adding functionality to new applications.
4. Project 2003 to comply with Ratified Senate Bill 991 (SB 991) in support of the way planning, budgeting and managing IT projects in state government is done.
5. Access 2003 for porting all currently used databases to the newer platform in an effort to utilize the newer security features.
6. Macromedia Dreamweaver 8.0 use to develop and prototype dynamic content for webpages.
7. Crystal Reports 10.0 to offer reporting through applications developed in house.
8. Review British Government IT Infrastructure Library (ITIL), a set of seven best-practices IT management books. ITIL provides businesses with a customizable framework of best-

practices to achieve quality service and overcome difficulties associated with the growth of IT systems.

9. Review of CERT Coordination Center (CERT/CC) documents to stay current on system management practices used to resist attacks on networked systems.
10. Review of code port of the LIMS system from VB 4.0 to VB .NET.
11. Researched the possibility of putting slides, photo albums and training material to be viewed from the web.
12. Gathered information on processing credit card transactions on-line.
13. Research databases that are actively updated and what fields should be considered protected.

## **Entomological Programs**

### **Movement of Live Insects for Research or Commercial Purposes**

NCDA&CS evaluated and approved federal applications (PPQ Permit Number 526) to move live plant pests into North Carolina for 954 insect species which includes several multiple entries. The large number of insects permitted in 2005 reflects the continued market in commercial production, sale, and movement of butterflies for education, outdoor weddings, and other functions.

### **Boll Weevil Eradication Program**

Cotton acreage for 2005 was 808,488.44 acres. Cotton was grown in 53 counties. There were 130,945 traps installed on 67,315 cotton fields. Trap installation began July 15, 2005, and trap removal was completed November 7, 2005. Eighteen temporaries were hired to assist with quality control and trapping.

### **Boll Weevil Capture**

There was one male boll weevil captured in Martin County during the 2005 cotton-growing season. A core of eight fields surrounding the capture field was trapped around the perimeter and within the field every 100 feet. All other cotton fields within a one-mile radius of the capture field were also trapped around the perimeter. Traps were serviced twice a week until the first hard frost. No additional weevils have been caught. The number of trapped fields and the frequency of servicing have been reduced to the core eight fields with servicing once a month. This will continue into the 2006 season when contract personnel will resume the trapping.

### **North Carolina Boll Weevil Assessment Information**

(As of December 1, 2005)

	<b>2005</b>	<b>2004</b>	<b>2003</b>
Number of Acres	807,032.31	722,601.0	785,296.3
Number of Growers	2,714	2,818	2,910
Acre Assessment	\$3.50	\$3.50	\$3.75
Assessments Due	\$2,824,613.09	\$2,529,103.50	\$2,944,861.16

<b>2005 Boll Weevil Trapping Summary</b>			
COUNTY	FIELDS	TRAPS	ACRES
	TRAPPED	SET	TRAPPED
Anson	214	507	3577.60
Beaufort	1388	3599	23418.50
Bertie	3813	6478	37871.90
Bladen	752	1738	9078.90
Cabarrus	31	91	482.3
Camden	31	87	626.60
Carteret	58	112	472.60
Chowan	1316	2808	18398.70
Cleveland	150	310	2129.40
Columbus	419	852	4061.20
Craven	1728	3125	16558.00
Cumberland	535	1326	10086.20
Davidson	29	95	742.40
Duplin	1059	2143	15624.60
Edgecombe	3375	7618	48860.80
Franklin	21	73	183.20
Gates	1293	2528	15205.60
Greene	1814	3274	19242.40
Halifax	7204	12004	64657.90
Harnett	1273	2363	14661.90
Hertford	1845	3093	16568.80
Hoke	893	2195	16879.10
Hyde	1060	2390	17146.70
Iredell	50	129	1040.10
Johnston	1460	2,883	17977.93
Jones	1676	3303	26729.90
Lee	60	76	357.70
Lenoir	2997	5475	33914.00
Lincoln	15	26	173.40
Martin	4789	8028	46388.90
Montgomery	88	178	526.00
Nash	1725	2,908	14828.78
Northampton	5243	9,960	59447.10
Onslow	697	1275	8012.90
Pamlico	433	769	3134.40
Pasquotank	134	495	3360.20
Pender	572	1098	7040.50
Perquimans	989	3072	20284.70
Pitt	3519	6458	35218.00
Richmond	149	372	3541.20
Robeson	1524	3947	32271.20
Rowan	68	125	665.90
Rutherford	17	38	318.00
Sampson	2283	5200	36522.25
Scotland	727	1837	16110.30
Stanly	635	1362	9986.50

Tyrrell	540	1250	3980.10
Union	274	659	5232.40
Wake	45	58	159.30
Warren	295	448	1900.00
Washington	1310	2480	15235.20
Wayne	2073	3727	23331.80
Wilson	2627	4500	24264.48
<b>Totals</b>	<b>67315</b>	<b>130945</b>	<b>808488.44</b>
	<b>Avg Acres per Trap:</b> 6.2	<b>Weevils:</b> 1	

### Imported Fire Ant Survey and Monitoring Program

The Red Imported Fire Ant (RIFA) continued to spread into new areas in North Carolina in 2005. Surveys have been tabulated and an evaluation for the extension of the quarantined area has been completed. Revisions to the IFA quarantine are anticipated for the 2006 calendar year, however, those recommendations have not yet been published.

Four temporary employees worked to survey along the existing quarantine line in 35 counties. The table below summarizes the 2005 RIFA temporary employee survey efforts.

### **RIFA WORK COMPLETED IN 2005**

Survey Totals by County

County	Miles Surveyed	Acres Surveyed	New Sites Included
Alamance	1192	106	
Beaufort	15		
Bertie	605	75	3
Bladen	20		
Buncombe	983	90	
Burke	1187	226	3
Caldwell	36	1	
Catawba	2082	260.5	7
Cherokee	931	235	173
Clay	651	307	56
Davidson	2078	435	21
Davie	20	15	
Durham	465	15	
Edgecombe	800	45	8
Forsyth	151	63	5
Franklin	1715	3	
Graham	45		
Granville	943		3
Guilford	1175	135	
Halifax	482	30	
Haywood	1078		
Henderson	1030	371	28

Iredell	1716	281	75
Jackson	2253	36	
Lincoln	2202	231	45
Macon	1195	564	44
Martin	60	5	3
Nash	1971	135	
Orange	509	3	
Person	25		
Randolph	1149	116	27
Rowan	1690	289	23
Rutherford	2403	261	20
Swain	1031	4	
Transylvania	557	238	1
<b>Total</b>	<b>34445</b>	<b>4575.5</b>	<b>545</b>

Eighteen imported fire ant inspection blitzes were carried out at North Carolina weigh stations in support of the federal fire ant quarantine on movement of articles regulated by the quarantine. Additionally, there were twelve potted media samples taken from nurseries under IFA quarantine compliance to determine if bifenthrin was properly incorporated. Two potting media samples were taken from bulk nursery suppliers to see if pesticides were properly incorporated to meet IFA specifications. By request, one sample was taken for the South Carolina Department of Plant Industry from a retail nursery to see if compliance was being met. The pine straw compliance agreement format has been approved by USDA APHIS PPQ so all pine straw bale producers in North Carolina who want to ship pine straw out of the IFA quarantine will soon be under compliance. There were approximately 400 people educated on the IFA Program during four IFA presentations given throughout the state for various agricultural agencies. The IFA Quarantine Program responded to more than 100 calls and requests for information that came in from consumers during 2005.

### **Sweetpotato Weevil Trapping Program**

In 2005, NCDA&CS personnel continued the statewide comprehensive sweetpotato weevil trapping survey on all commercially grown sweetpotato fields. Traps containing the female sweetpotato weevil's pheromone were placed at the rate of one trap per ten acres with a minimum of two traps per field. Commercial sweetpotatoes were grown in 39 counties for a total of 35,797.22 acres. There were 8,484 traps placed in 4,159 fields. The traps in all the commercial production areas were negative for 2005.

Storage facilities continue to be monitored on a year-round basis with one trap placed in each section of the storage house and an additional trap stationed outside the principal entrance. Again, no sweetpotato weevils were captured during 2005.

<b>2005 Sweetpotato Weevil Trapping Summary</b>			
COUNTY	NUMBER OF FIELDS TRAPPED	NUMBER OF TRAPS SET	NUMBER OF ACRES TRAPPED
Bladen	39	88	442.70
Brunswick	2	4	12.60
Buncombe	1	2	0.25
Camden	1	2	2.00
Cartaret	4	6	15.00
Chowan	17	37	213.30
Columbus	585	980	2925.00
Craven	2	4	8.10
Cumberland	153	153	1902.50
Duplin	75	200	1034.67
Edgecombe	185	419	2128.00
Greene	189	415	1875.00
Halifax	6	13	91.10
Harnett	167	382	1352.10
Hertford	2	4	9.40
Hoke	18	36	25.00
Johnston	695	1,640	5844.50
Jones	1	2	5.00
Lee	14	31	50.50
Lenoir	37	84	322.60
Martin	2	4	3.50
Moore	18	43	62.85
Montgomery	1	3	13.00
Nash	651	1,354	4895.70
Northampton	1	2	1.00
Onslow	7	10	77.10
Pasquotank	3	6	13.30
Pender	8	16	12.00
Pitt	67	164	1072.00
Richmond	15	36	65.00
Robeson	0	0	0.00
Sampson	492	896	5325.40
Scotland	8	10	5.00
Stokes	12	26	49.00
Tyrrell	2	4	6.00
Wake	136	267	1110.05
Warren	2	4	9.00
Wayne	166	350	1484.00
Wilson	375	787	3334.00
<b>Totals</b>	<b>4159</b>	<b>8484</b>	<b>35797.22</b>
	<b>Avg Acres per Trap: 4.2</b>	<b>Weevils: 0</b>	

## 2005 Blueberry Export Certification Program

The Canadian Food Inspection Agency requires that all fresh blueberries shipped to Canada come from growers who participate in a Blueberry Certification Program. The program consists of monitoring and control procedures for the blueberry maggot, *Rhagoletis mendax*. Forty-three North Carolina production areas were monitored (3124.4 acres total representing 91 fields) throughout the harvesting and shipping period and were issued certification documents. No blueberry maggots were detected in any of the fresh market blueberries being shipped to Canada in 2005.

## 2005 Gypsy Moth Program

### Slow the Spread

The 2005 treatment season proved to be a busy one for NCDA&CS. In the Slow the Spread area, nine treatment blocks were proposed to receive two applications of Btk or one application of pheromone flakes. The National Wildlife Refuge denied NCDA&CS treatment of the Corapeake block located in Gates County due to the presence of Hessel's Hairstreak, a species of concern that feeds on Atlantic Cedar.

Kent Neise with Prime Air LLC, received the contract to treat five blocks with two applications of Btk and a single treatment of a 1,000-acre block with Gypcheck in Virginia. The contract was awarded at a price of \$14.92 per acre for the Btk treatments and \$5.92 per acre for the Gypcheck treatments. Two turbine thrush aircraft were used to treat the four remaining Btk blocks with Foray 76B at a rate of 1/3 gallon per acre. The Gypcheck block received one application at a rate of one gallon per acre. Both aircraft were equipped with AG-Nav GPS systems and rotary atomizers. The treatments began on April 21 and ended on April 28.

Under a USFS contract, Al's Aerial Spraying treated 43,340 acres with Disrupt II pheromone flakes. The four blocks located in north central North Carolina received one application of pheromone flakes at a rate of six grams per acre. The treatments began on June 9<sup>th</sup> and ended on June 11<sup>th</sup>.

Block Name	Acres	Product	Rate	# applications
Knotts Island	930	Foray 76B	1/3 gallon/acre	2
Shiloh	2,000	Foray 76B	1/3 gallon/acre	2
Jarvisburg	1,500	Foray 76B	1/3 gallon/acre	2
Coinjock	1,800	Foray 76B	1/3 gallon/acre	2
Corapeake	0*	Foray 76B	1/3 gallon/acre	2
False Cape State Park	1,000	Gypcheck	1/2 gallon/acre	1
Triple Springs	5,294	Disrupt II	6 grams/acre	1
Stovall	26,385	Disrupt II	6 grams/acre	1
Nelson	960	Disrupt II	6 grams/acre	1
Price	10,701	Disrupt II	6 grams/acre	1
<b>Total</b>	<b>50,570</b>			

\* Denied treatment by National Wildlife Refuge

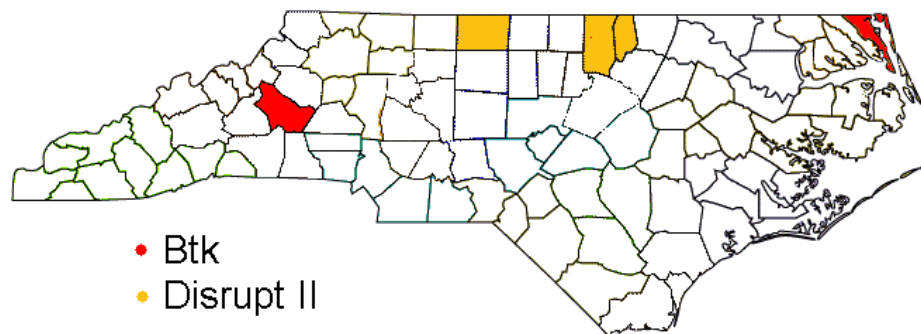


## Gypsy Moth Eradication

The Gypsy Moth eradication project consisted of one block of 28,744 acres located in Burke County. The contract was awarded to Helicopter Applicators and Summit Helicopters at a cost of \$11.91 per acre. Helicopter Applicators supplied one UH-1H rotary aircraft and Summit Helicopters provided one Bell 205 to treat 28,744 acres with two applications of Foray 76B at a rate of 1/3 gallon per acre. Both aircraft were equipped with AG-Nav GPS and rotary atomizers. Despite having personnel from two different companies, the project ran very smoothly. The project began on April 18<sup>th</sup> and ended on May 3<sup>rd</sup>. The project had a total treatment time of 65.33 hrs with an average of 3.11 hrs per day.

Helicopter Applicators		Summit Helicopters	
Pilot	Jim Miller	Pilot	Ron Jackson
Helicopter	UH-1H	Helicopter	Bell 205
Track error	1.39 meters	Track error	1.36 meters
Application rate	.33 gpa	Application rate	.33 gpa
Application error	-.46 percent	Application error	-.20 percent
Production rate	1,015 ac/hr	Production rate	1,028 ac/hr
Efficiency rate	914 ac/hr	Efficiency rate	957 ac/hr

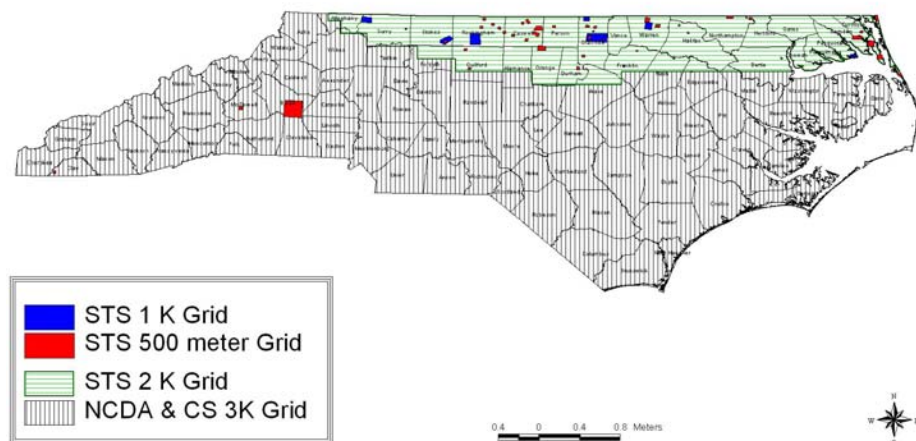
## 2005 Gypsy Moth Treatment County Locations



Trapping Program

The 2005 trapping program was divided into two different areas, Slow the Spread and Statewide. In the Slow the Spread area, traps were placed on a two-kilometer base grid with one-kilometer and 500-meter delimit grids in areas that had high catches or treatments in 2004. The Statewide traps were placed on a three-kilometer base grid with 500-meter grids in areas of concern. The Slow the Spread area was divided into 23 separate trapping bid units. Eleven private contractors placed, inspected and pulled 8,374 traps at an average cost of \$27.58 per trap. The NCFS placed traps in 30 counties in the statewide program. Seventeen temporary employees and 18 field specialists set traps in the remaining counties.

## North Carolina Trapping Density



## 2005 Trapping Results by County

County FIPS	County	Total Traps Set	STS Traps	Statewide Traps	Total Catch	Positive Traps
1	Alamance	226	182	44	15	9
3	Alexander	77	0	77	1	1
5	Alleghany	127	103	24	0	0
7	Anson	100	0	140	1	1
9	Ashe	122	0	122	27	18
11	Avery	58	0	58	0	0
13	Beaufort	250	0	250	1	1
15	Bertie	410	357	63	2	2
17	Bladen	239	0	239	0	0
19	Brunswick	308	0	308	1	1
21	Buncombe	182	0	182	0	0
23	Burke	550	0	550	106	63
25	Cabarrus	107	0	107	0	0
27	Caldwell	105	0	105	25	13
29	Camden	249	249	0	69	22
31	Carteret	82	0	82	1	1
33	Caswell	551	551	0	58	29

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35	Catawba	123	0	123	7	4
37	Chatham	213	0	213	1	1
39	Cherokee	87	0	87	1	1
41	Chowan	119	119	0	0	0
43	Clay	182	0	182	13	4
45	Cleveland	129	0	129	11	9
47	Columbus	259	0	259	0	0
49	Craven	182	0	182	1	1
51	Cumberland	196	0	196	1	1
53	Currituck	409	409	0	741	83
55	Dare	129	39	94	10	7
57	Davidson	161	0	161	12	6
59	Davie	81	0	81	2	2
61	Duplin	234	0	234	0	0
63	Durham	223	223	0	0	0
65	Edgecombe	190	76	114	0	0
67	Forsyth	190	122	68	4	1
69	Franklin	311	284	27	5	5
71	Gaston	103	0	103	0	0
73	Gates	275	275	0	485	38
75	Graham	48	0	48	0	0
77	Granville	595	595	0	50	24
79	Greene	76	0	76	0	0
81	Guilford	360	331	50	32	26
83	Halifax	503	503	0	25	18
85	Harnett	179	0	179	0	0
87	Haywood	100	0	100	0	0
89	Henderson	131	0	131	32	6

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91	Hertford	241	241	0	5	5
93	Hoke	79	0	79	0	0
95	Hyde	159	0	159	2	2
97	Iredell	178	0	178	3	1
099	Jackson	194	0	194	0	0
101	Johnston	234	0	234	0	0
103	Jones	113	0	113	0	0
105	Lee	77	0	77	1	1
107	Lenoir	107	0	107	0	0
109	Lincoln	90	0	90	0	0
111	McDowell	144	0	144	3	2
113	Macon	98	0	98	0	0
115	Madison	131	0	131	6	3
117	Martin	183	14	139	2	2
119	Mecklenburg	144	0	144	9	9
121	Mitchell	46	0	46	0	0
123	Montgomery	115	0	115	3	3
125	Moore	199	0	199	2	2
127	Nash	257	160	97	0	0
129	New Hanover	68	0	68	0	0
131	Northampton	427	427	0	13	13
133	Onslow	156	0	156	2	2
135	Orange	340	340	0	5	5
137	Pamlico	112	0	112	0	0
139	Pasquotank	167	167	0	6	4
141	Pender	237	0	237	0	0
143	Perquimans	176	176	0	0	0
145	Person	281	281	0	9	7

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147	Pitt	236	0	236	1	1
149	Polk	57	0	57	7	3
151	Randolph	232	0	232	8	7
153	Richmond	138	0	138	4	2
155	Robeson	268	0	268	0	0
157	Rockingham	559	559	0	39	27
159	Rowan	137	0	137	5	4
161	Rutherford	143	0	143	2	2
163	Sampson	288	0	288	1	1
165	Scotland	90	0	90	0	0
167	Stanly	120	0	120	0	0
169	Stokes	364	364	0	9	6
171	Surry	387	387	0	4	4
173	Swain	39	0	39	0	0
175	Transylvania	68	0	68	5	3
177	Tyrrell	101	0	101	0	0
179	Union	172	0	172	0	0
181	Vance	216	216	0	4	4
183	Wake	306	134	172	1	1
185	Warren	462	460	2	45	22
187	Washington	112	0	112	5	5
189	Watauga	116	0	116	8	7
191	Wayne	164	0	164	0	0
193	Wilkes	192	12	179	9	6
195	Wilson	113	0	113	0	0
197	Yadkin	116	18	98	3	2
199	Yancey	75	0	74	20	6
Total		19555	8374	11224	1991	572

## Nursery Certification Program

Total Nurseries (All categories\*) -1,702

### Number of Nurseries by Category

- Category A 139
- Category B 236
- Category C 999
- Category I 67
- Category R 261

### Total Acreage (All categories\*) –16,132.7

- Category A 694.3
- Category B 5,665.1
- Category C 9,562.7
- Category I 76.8
- Category R 133.8

Total Collected Plant Certificates Issued - 78

Total Number of Nursery Dealers\*\* - 2,152

#### \*Categories

A—Retail - Any nursery where 80% or more of the nursery stock sold is to the final consumer for their use.

B—Wholesale - Any nursery where 80% or more of the nursery stock sold is to other nurseries, dealers, or other persons for resale.

C--Retail and Wholesale - Any nursery where sales consist of nursery stock which is sold as follows: (1) Directly to the final consumer, and also (2) To other nurseries and/or dealers for resale with the percentage of total sales for each category being less than 80%.

I—Institutional - Any nursery owned or operated by any governmental agency.

R—Registered - Any nursery less than one acre in size that produces nursery stock, but does not sell, barter, or exchange such articles outside the state.

**\*\*Nursery Dealer – Any person not a grower of nursery stock who obtains certified nursery stock and/or collected plants for the purpose of distribution or sale independent of the control of a nursery.**

## Phytosanitary Certification Program

Number of Phytosanitary certificates issued by category:

<u>Type of Certificate</u>	<u>2004</u>	<u>2005</u>
Federal Phytosanitary Certificate	1,421	1,702
Re-Issue Certificate	57	148
Re-Export Certificate	27	69
Processed Product Certificate	30	76

State Phytosanitary Certificate	237	203
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NCDA&CS Plant Protection Specialists issued a total of 1,995 federal certificates for agricultural commodities leaving the United States in 2005. This is a one year increase of 460 certificates. The majority of the certificates were issued for lumber, tobacco, cotton, cotton seed, and peanuts. A total of 203 state phytosanitary certificates were issued for agricultural commodities moving within the United States.

## **Plant Conservation Program**

### **Native Flora Protection**

The Plant Conservation Program continued to focus significant resources on protecting the best remaining sites that support North Carolina's imperiled plant species. The Plant Conservation Program Board approved additional land purchases under the auspices of a yearly site acquisition plan that includes nine sites across North Carolina.

Several grants were obtained from the Natural Heritage Trust Fund (NHTF) to aid in land protection and acquisition efforts. These grants were as follows:

Harvest Field - Phase I:	\$160,000
Marks Creek:	\$500,000
Penny's Bend/Eno River Diabase Sill: Phase III:	\$750,000
Tater Hill Plant Conservation Preserve, Hodges Tract:	\$181,185
Big Pond Bay Plant Conservation Preserve:	\$115,600
Total:	\$1,706,785

### **Native Flora Management**

Active habitat restoration and management activities were implemented at several important sites for rare plant species during 2005. Notable events included implementation of the first ever prescribed fires at Denson's Creek Plant Conservation Preserve, Eno River Diabase Sill Plant Conservation Preserve, and two sites administered by the U.S. Army Corps of Engineers. Each burn was carried out in partnership and each was tremendously successful at meeting objectives.

Several staff members obtained the fire training necessary for NCDA&CS to implement prescribed fires. This training was an essential first step toward developing the in-house expertise the Plant Conservation Program needs to meet growing management demands at Preserves across North Carolina. In addition, a full-time temporary employee was hired who has increased the management capacity of the Program statewide.

Plant Conservation Program staff continued to provide to input to a number of different land managers in hopes of facilitating added benefits to native flora. Examples included invited presentations at NCSU and Department of Forest Resources (Region 1) workshops. In addition, working with partners the Plant Conservation Program was able to receive two small grants that will help support management efforts at Boiling Springs Lakes and Eno River Diabase Sill Preserves.

## Education Initiatives/State Fair

The Plant Conservation Program developed a new exhibit for the Our Land, Our Legacy exhibit at the North Carolina State Fair. The exhibit featured representative habitats of the mountains, piedmont, and coastal plain regions using all native plant species provided by the North Carolina Botanical Garden, and carried the Program's message to thousands of citizens.

## Ginseng Exports

For the 2004-2005 harvest season, 4,271 pounds (dry weight) of wild ginseng root were reported to NCDA&CS specialists. This harvest amount is the lowest on record in North Carolina since 1980, and down almost 1,300 pounds from the previous year.

County	Year 2004
Alamance	0
Alexander	5
Alleghany	37
Ashe	227
Avery	132
Buncombe	255
Burke	28
Caldwell	86
Caswell	0
Catawba	2
Cherokee	338
Clay	251
Cleveland	0
Davidson	0
Davie	0
Forsyth	4
Gaston	0
Graham	0
Guilford	1
Haywood	484
Henderson	77
Iredell	2
Jackson	397
Lincoln	5
Macon	351
Madison	239
McDowell	167
Mecklenburg	0
Mitchell	222
Polk	57
Randolph	0



Rockingham	0
Rutherford	12
Stanly	0
Stokes	3
Surry	29
Swain	251
Transylvania	44
Watauga	147
Wilkes	44
Yadkin	0
Yancey	224
<b>State Total</b>	<b>4,271</b>

## **Plant Pathology Programs**

The “Plant Pathology Programs” section includes related programs involving the NCDA&CS Plant Pathologist. Programs are grouped in order by EXPORT, IMPORT, NURSERY, SUDDEN OAK DEATH, TOBACCO, VEGETABLE, LABORATORY, and UPDATE ON PREVIOUS QUARANTINE ISSUES.

### **EXPORT: General Export Certification Support**

Plants and plant products shipped from the U.S. into a foreign country must be accompanied by a phytosanitary certificate indicating inspections or other specific requirements have been met. [The number of phytosanitary certificates issued by Plant Protection Section personnel is reported elsewhere in the Division report.] Countries vary greatly in what they require for various types of commodities such that careful research and interpretation of requirements are needed for each request. Demands on personnel (time and travel) for this activity have escalated in recent years. The top three leading commodities in terms of numbers of certificates issued were lumber, cottonseed grain, and tobacco. The Plant Pathologist received and answered numerous inquiries from Section personnel as well as North Carolina and USDA APHIS PPQ personnel regarding interpretation of certification requirements relating to plant pathogenic organisms and disease distribution information. She coordinated sampling and inspection procedures for seeds and nematode certification (see EXPORT: Nematode Certification), and developed or refined specific certification procedures for specific situations as needed. This year, the Plant Pest Administrator established a North Carolina Trade Support Team consisting of personnel from the USDA APHIS PPQ, the NCDA&CS Marketing Division, and the Plant Industry Division (including the Plant Pathologist), and this group met two times to exchange and review information related to North Carolina trade and export issues.

### **EXPORT: Tobacco Blue Mold Oospore Field Survey (for Tobacco Export to China)**

The overall objective of phytosanitary protocols for export of tobacco, signed by the United States and the People’s Republic of China in February 2001, is to prevent the introduction of the tobacco blue mold pathogen and other quarantine pests into China and to ensure the safety of

China's tobacco production. As part of this protocol, USDA APHIS PPQ agreed to provide Chinese regulatory officials with a yearly report on tobacco blue mold investigations in the United States. The report is to include information on areas affected by tobacco blue mold, the methodology of a blue mold oospore survey, and oospore survey results. The current strain of blue mold occurring in the U.S. is not believed to form oospores. Oospores, when they do form, do so inside the leaf tissue and are more resistant than the common, short-lived spores that are dispersed by the wind and primarily responsible for spreading the disease. Oospores, not the other short-lived spores, are believed by the Chinese to pose a phytosanitary risk. The Plant Industry Division (specifically, the Plant Pathologist) was designated by USDA APHIS PPQ to oversee and coordinate the survey in North Carolina in 2005, as it had also done in 2001, 2002, 2003, and 2004. Blue mold was first reported late in the season and affected primarily the burley (western) region rather than the flue-cured (eastern) region. The North Carolina Cooperative Extension Service (NCCES) agreed to again collect samples from the affected counties in a show of excellent in-state cooperation. North Carolina used state-specific procedures written by the Plant Pathologist which were based on those distributed by PPQ. Samples from North Carolina and the other states participating in the survey were tested by the Plant Pathogen Identification Laboratory at NCSU, Raleigh. The surveys completed in 2005 (as well as those in 2001, 2002, 2003, and 2004) were negative for oospores in samples from North Carolina as well as all other states surveyed. This survey must be completed every year by states that want to export tobacco to China. This is important to the region as well as to any given state because of how tobacco is stored and marketed.

In late October, a Chinese buying delegation came to North Carolina to visit warehouses and other tobacco-holding facilities to tour, observe, and collect samples on which to base purchasing decisions. They utilized one of the Section's plant pathology laboratories to assay tobacco samples for blue mold oospores [no oospores were found]. Some purchases were finalized. Around 13.7 million pounds of flue cured tobacco was purchased from the Flue Cured Cooperative Stabilization Corporation (valued at ~ \$35.3 million) and around 4 million pounds were purchased from other leaf dealers and manufacturers (valued at ~ \$10 million).

### **EXPORT: Special Procedures for Moving White Potatoes into Canada**

The Canadian Food Inspection Agency (CFIA) and farmers in Canada are concerned about additional introductions of the soybean cyst nematode (SCN), which occurs in numerous U.S. states. Ordinarily, below-ground portions of any plant grown in SCN-infested areas cannot be certified for shipment into Canada. SCN could be moved with soil on white potatoes grown in infested states such as Virginia, North Carolina, Maryland, and New Jersey. However, many years ago the CFIA, potato industry representatives in both countries, and plant pest regulatory and marketing officials in affected states worked together to develop a program to minimize the pest-risk associated with movement of potatoes to processing locations (chippers) in Canada under Canadian ministerial exceptions and certification for soil cleanliness. Although the operational procedures are updated yearly by the Plant Pathologist after consultation with CFIA and the involved states, the NCDA&CS Marketing Division is primarily involved with this process. These operational procedures include emergency exemptions and procedures to follow in the event that wet weather and wet soil conditions throughout the harvesting area result in no potatoes being available that meet the grade standards for soil cleanliness for movement into Canada, at which time our Division's personnel would then become involved. The emergency exemption was not needed in 2005. According to NCDA&CS Marketing Division personnel,

North Carolina growers shipped only 221 bulk loads of processing potatoes and 15 loads of fresh market table stock (in bags) to Canada. This was down from 578 and 1185 loads in 2003 and 2002, respectively, but greater than the 119 loads in 2004 when ministerial exemptions were not granted in spite of established contracts [Canadian growers had storage potatoes on hand and usually storage potatoes are in shorter supply by the time North Carolina starts shipping.] These issues caused growers to be hesitant to establish contracts in 2005, and there were 4,000 less acres planted (down to 14,000 from 18,000 acres in 2004). A new policy is being developed with Canada that involves changes to the importation requirements and a phase-in process over several years. This may alleviate these and other problems in the future.

### **EXPORT: Heat Treatment Certificates for Wood Packing Material to China**

Concerned that pinewood nematode was entering China in imported conifer wood, Chinese plant pest regulatory officials initiated a heat treatment entry requirement for conifer solid wood packing material in 2000. The heat treatment is certified by the exporter on PPQ Form 553 (“Conifer Solid Wood Packing Material to the People’s Republic of China”) but must be endorsed by state or federal plant pest regulatory officials. These certificates enable the shipment of computer and electronic equipment and various other items which would otherwise have been prohibited entry into China because they were in conifer-wood crates or on conifer-wood pallets. Plant Protection personnel (primarily Raleigh Staff but also a few Field Specialists) evaluated, required corrections when necessary, and endorsed ~ 493 certificates in 2005. This number was up from ~440 and ~350 in 2004 and 2003, respectively, even though there was a change in the procedures by which China agreed to begin accepting wood packing material stamped with an internationally-recognized symbol to indicate compliance in lieu of a certificate. When PPQ directed states to stop validating the certificates in July, it caused considerable problems for exporters when their earlier “letters of credit” stated a certificate was required or when the Chinese port officials did not get word of this change, which originally was planned for implementation in January 2006. The Plant Pathologist spent a considerable amount of time working through these problems individually with the exporters and helping to get shipments released. This should cease to be a concern after January 1, 2006.

### **EXPORT: Nematode Certification**

Because of soybean cyst nematode concerns, Canada requires special certification of plants with roots or below-ground parts (such as bulbs) from North Carolina regardless of whether or not there is soil present on the plant material. Similarly, California and Arizona have reniform and burrowing nematodes certification requirements. In 2005, 32 North Carolina nurseries were soil-surveyed on a minimum 25x25’ grid (or the shipment itself was intensively sampled) in order to certify plants for shipment into to California, Arizona, or Canada., Plant Protection Specialists collected the soil samples and submitted them to the Nematode Advisory Service (NCDA&CS Agronomic Division) for assay. Procedures for sampling and submission of samples are updated and maintained by the Plant Pathologist. The Field Supervisor receives written results from the lab, interacts directly with field personnel, and maintains records of the surveys.

### **IMPORT: Movement of Plant Pathogens for Research and Other Purposes**

Federal PPQ Form 526 (“Application and Permit to Move Live Plant Pests or Noxious Weeds”) allows the movement of plant pathogens and other pests into North Carolina from other states or

countries for the purpose of conducting research, diagnostic identifications, or industrial or other applications. USDA APHIS PPQ receives the applications initially, evaluates, adds conditions, and forwards to the Plant Pathologist for further evaluation and approval. Because all plant pathogenic organisms are regulated, pest-risk of each organism must be evaluated to ensure that adequate safeguards are listed in the conditions of the permits. Fifty-two (52) applications for new permits or amendments to existing permits were evaluated by the Plant Pathologist, with ~12 requiring her to make comments or acquire additional information from PPQ or the applicant before approval. These 52 included a total of ~161 fungi, ~11 bacteria, ~3 viruses, and ~3 nematodes. [All these were specifically listed by name.] Two of the permits were more general, involving imported soil from which bacteria would then be isolated. Eight (8) others were open-ended to receive non-specified or unknown organisms for identification and other purposes. These latter types of permits, as well as those for higher-risk organisms, require lab inspections prior to issuance. These are conducted cooperatively between PPQ and the NCDA&CS. PPQ moved towards the establishment of an electronic “E-permit” system in the Fall 2005. The Plant Pathologist received the first application submitted under this new format for evaluation in early December 2005. Additionally, there is an ongoing cooperative effort between the Plant Pathologist and faculty at NCSU to maintain and update lists of “widely prevalent” plant viruses, fungi, and bacteria in joint projects with related American Phytopathological Society committees and USDA APHIS PPQ. Such lists are intended to help to expedite the processing of applications.

### **IMPORT: Imported Plants and the Post-Entry Quarantine (PEQ) Program**

The federal Post-Entry Quarantine Program, conducted cooperatively between USDA APHIS PPQ and State plant pest regulatory officials, enables individuals or companies to import from outside the U.S. plant material that may pose a plant pest risk. Plants must be kept under quarantine for two growing seasons and be inspected for pests of quarantine significance (primarily diseases) before the importer is allowed to move, use, or sell them without restriction. The program also involves conducting pre-importation, site-screening inspections. There were approximately 5,452 plants (in 14 separate shipments) under post-entry quarantine at some time in 2005. The great majority (>85% of the total number of plants) consisted of ~4,644 maples in 3 shipments. Five other shipments had only 1-11 plants per shipment but required the same number of inspection visits. The Plant Pathologist addressed questions from nurseries and individuals wishing to import plants, referring them when necessary to the appropriate PPQ office to assist in obtaining the necessary import permits and other documentation. It has become more apparent that plant shipments are slipping through the ports without the required inspection and documentation (i.e., we hear about these from the importers themselves, not from PPQ notices). PPQ is notified and remedial actions are taken when this occurs.

### **NURSERY: Diagnosis of Problem Plant Samples**

In 2005, Plant Protection Specialists and other Section personnel collected ~39 problem plant samples from nurseries during their nursery inspection visits and submitted them to the NCSU Plant Disease and Insect Clinic (Raleigh) for diagnosis. These were assayed by the Clinic as a courtesy to the Section under a voucher system. The Plant Pathologist provides operational procedures for the submission of these samples and serves as the liaison between the Specialists and the Clinic, assisting with interpretation of diagnoses and recommendations when necessary. The Plant Pathologist also responded to homeowner requests for diagnosis or general plant

disease. These are often then referred to the NCCES in their respective counties.

### **NURSERY: Dogwood Anthracnose**

Dogwood anthracnose, caused by the fungus *Discula destructiva*, continues to spread throughout the western area of the state in native woods and is severely reducing or eliminating the dogwood populations in most areas where it occurs. The NCFS estimates that 300 million dogwood trees in North Carolina covering 2.5 million acres are infected by, or have died from, this disease. Native trees in 29 counties have been found infected based on surveys conducted by the forest service. No new counties were confirmed positive for dogwood anthracnose in 2005. This survey information is used to help Plant Protection Specialists during their annual inspections to target nurseries growing dogwoods in high-risk areas. No anthracnose was found in any nursery this year. Strict handling procedures are outlined for use in the event of such a detection to help prevent movement out of the known-infested area.

### **NURSERY: Daylily Rust**

[This will be the last report on daylily rust in the Division report as it takes its place with other endemic pests.] Daylily rust, caused by the fungus *Puccinia hemerocallidis*, is a damaging daylily disease found for the first time in the U.S. in 2000, which has since spread to all parts of the U.S. It initially raised regulatory concerns but has now become a quality issue. A policy to handle detections in North Carolina nurseries and nursery dealers was developed by the Plant Pathologist after consultations with and polling of Southern Plant Board states. The following became part of operational procedures in March. Specialists look for daylily rust as part of routine inspections but do not target a specific time period. If rust is found on plants in nurseries, they require cutting back foliage, treating with approved fungicides on a rotational schedule as recommended by NCSU personnel, and waiting for re-growth of symptom-less foliage before allowing sale (compliance agreement or not at their discretion). If rust is found on plants at retail outlets, they require removal from the sales area (stop-sale or not at their discretion). We consider daylily rust to be a management problem rather than a regulatory issue because we cannot consistently monitor movement of plants into North Carolina from other locations nor can we inspect all daylily nurseries at the time optimal for rust detection. For long-term management of the disease, it was agreed that highly-susceptible cultivars should be eliminated from inventory to protect less-susceptible ones from high disease pressure. Also, there is evidence to suggest the disease may be partially self-eliminating in varieties that go dormant over the winter if the climate is cold enough to kill back all green tissue.

### **NURSERY: Strawberry Plant Inspections**

Strawberry plants are defined as nursery stock under the NCDA&CS nursery certification regulation, and nursery stock must be inspected annually. However, additional inspection procedures are followed for strawberry plants (i.e., special timing of inspections and more intensive inspection rates) due to the threat of anthracnose disease. [Two species of fungus can cause “anthracnose”: one that primarily causes crown rot, and the other that causes primarily berry rot. The latter is of more concern to the berry grower.] Although NCDA&CS-certified nursery plants are believed to be “apparently free” of anthracnose when sold, plants can still be infected, especially if anthracnose was found anywhere at the field location during the growing season. These plants may then show symptoms later after being set in the berry-production

fields. Fungicide control recommendations are made by NCSU personnel primarily for berry growers rather than the plant grower in order to avoid development of resistance. North Carolina berry growers also buy tips and plants from Canada, California, and other states, often based only on a visual inspection. Introductions of serious diseases have been associated with such plants in recent years. The new North Carolina Crop Improvement Association (NCCIA) certification program (in cooperation with the NCSU Micropropagation Unit) gives plant buyers a better option. The NCCIA program has a zero inspection tolerance for anthracnose (both species) and also has requirements for plant source, sanitation, and other things the NCDA&CS nursery certification regulation cannot require but which are known to be essential for production of anthracnose-free plants. NCDA&CS supports the NCCIA program and has encouraged all nurseries to participate in it. Under a Memorandum of Understanding first established in 2004, NCDA&CS and NCCIA coordinates the two inspection programs to make clear distinctions and outline respective responsibilities. All plant growers, regardless of whether or not they are under the NCCIA program, are still licensed as NCDA&CS nurseries, but NCCIA takes responsibility for conducting and reporting inspections of plants under the NCCIA program. The Plant Pathologist participated in an informational and planning workshop held annually for nurserymen in the NCCIA program (held in December this year). There were six strawberry nurseries growing ~ 150 acres of plants in North Carolina in 2005. Three of these accounted for ~98% of the total number of plants produced.

### **SUDDEN OAK DEATH: Survey, Regulatory, and Service Activities**

General background and links to other information concerning Sudden Oak Death (SOD), caused by *Phytophthora ramorum* can be found on our Plant Protection Section website under “New Pest Alerts.” This disease is killing thousands of oak trees in California and limited numbers in Oregon, and movement of nursery plants that can harbor the disease is regulated by federal and state quarantines. Funding for our survey and regulatory activities is provided by USDA APHIS PPQ under a Cooperative Agreement. An extensive report of all activities related to this program is available upon request from the Plant Pathologist but is only summarized here. The major activity areas were:

- a) educating and training state personnel to conduct surveys and follow PPQ protocols.
- b) identifying high-risk nurseries and dealers to include in the nursery survey by examining extensive shipping records received over the past year.
- c) conducting trace-forward actions (TFs). Traceforward actions involve tracking down plants shipped to North Carolina from nurseries in California where SOD was found. We had two TFs in 2005. One involved two locations (one nursery and one nursery dealer), and the other involved nine homeowner shipments. This was significantly fewer than what occurred in 2004 (i.e., four TFs with 40 to 170 locations each, and one other smaller TF). No SOD was found at any location in North Carolina as a result of inspections and plant sampling/testing.
- d) conducting an SOD survey of nurseries and nursery dealers. The survey was conducted April 28 through mid-June, with 120 locations surveyed. These included a re-survey of all TF locations from 2004/2005 (61 locations) as well as 59 others. Around 1,558 plants were sampled at these locations and tested in the new NCDA&CS lab. No SOD was detected during the survey.
- e) developing a job description and recruiting for a SOD survey coordinator (temporary position). A survey coordinator was hired and employed from April 7 to August 8 (4

months) to coordinate the survey, interact with field and lab personnel, and provide data to the CAPS coordinator for NAPIS input.

- f) developing and maintaining a lab to assay plant samples for SOD. A Laboratory Research Specialist was recruited and hired to fill a vacated position in the Seed Section that was restructured (see more information under the LABORATORY section). She was subsequently trained to conduct ELISA screening tests on plant samples collected as part of the SOD program. She screened all samples collected during the nursery survey and the TF regulatory activities, as well as those submitted by homeowners. Samples testing ELISA-positive were sent to NCSU for DNA extraction, and the extractions were then forwarded to the national PPQ lab for further testing as required by PPQ protocol. The Laboratory Research Specialist later developed DNA-extraction capability and is proceeding with the development of real-time PCR testing capabilities for SOD at the present time.
- g) establishing a homeowner testing service and disseminating information to the public. A testing service was publicized through a news release and our Plant Protection Section website. The NCCES assisted with this effort to identify plants that might be infected with SOD in the landscape. Samples were assayed in the new NCDA&CS lab. No SOD was found in any samples.

In addition to the major activity areas described above, in September the Plant Pathologist participated in an invitational-workshop sponsored by PPQ in Riverdale, MD to provide input for drafting a revised nursery survey protocol for 2006. Representatives from six other states also attended. PPQ intends to have the revised protocol finalized and available in a more timely way prior to the 2006 survey.

### **TOBACCO: Plant Importation and Certification Inspections**

The Tobacco Plant Certification regulation requires that anyone who moves tobacco plants into North Carolina from another state do so under an import permit system. The previous five years' importers are sent reminder letters in January of this requirement. There were no applications received in 2005. Although the import permit program was at one time extensive, most North Carolina tobacco growers today grow their own plants in greenhouses here or obtain them from other growers locally. [Traditional plant beds have essentially become obsolete in the flue-cured area.] However, under the regulation, plants sold for planting in a location more than 75 miles away from the place of production must be inspected and certified. A major reason for this requirement is the possibility of moving blue-mold infected plants from one growing region into another, starting an epidemic prematurely. There were three certified greenhouse tobacco plant growers in 2005. These growers required weekly inspections during the shipping season and the issuance of a certificate to provide proof of inspection.

### **VEGETABLE: Plant Importation and Certification Inspections**

Plant Protection Specialists did not document vegetable plant inspections at dealer locations or seed potato spot-checks at end-user locations, but no complaints were received. We had one certified greenhouse nursery (for sweetpotato cuttings) requiring weekly inspections during the shipping season. All other sweetpotato cutting and seed producers were inspected under the NCCIA/NCSU Micropropagation Center certification program, which meets the requirements of the North Carolina vegetable plant certification regulation. Plant growers are encouraged to

participate in the NCCIA program whenever possible.

### **LABORATORY: Establishment of a Regulatory Support Laboratory**

A laboratory position in the Seed Section was vacated, and it was transferred to the Plant Protection Section to be supervised by the Plant Pathologist. Prior to 2005, the Plant Protection Section did not have a lab to process samples collected as part of regulatory or survey activities; rather, it had contracted with NCSU when a need arose. A new job description was prepared by the Plant Pathologist and Plant Pest Administrator to include Plant Protection Section responsibilities, interviews were completed in December 2004, by the Plant Pathologist and Seed Section Administrator, and a Laboratory Research Specialist was hired to start work in January 2005. In addition to keeping the previous position's responsibilities for fescue endophyte testing and reporting (for the Seed Section) and tobacco fertilizer bioassays (for the Fertilizer Section), the Laboratory Research Specialist processed sudden oak death survey, regulatory, and service samples in 2005 (see below). The Laboratory Research Specialist also developed DNA-extraction and real-time PCR capabilities and will expand to include other Plant Protection Section survey and regulatory activities (including other diseases, insects, and weeds) as needed. The NCSU Plant Disease and Insect Clinic will remain the premier diagnostic lab in North Carolina, providing specialized diagnostic assistance for our nursery and other plant problem samples as it has done for over 25 years.

### **LABORATORY: Sudden Oak Death Sample Testing**

Activities related to Sudden Oak Death testing are reported under the "Sudden Oak Death" section. The Research Laboratory Specialist conducted ELISA screening on all samples collected as part of the Sudden Oak Death survey and regulatory program in 2005.

### **LABORATORY: Fescue Endophyte Testing Program**

In Spring 2005, the Plant Pathologist, Laboratory Research Specialist, and Seed Section Administrator met with NCSU research and extension personnel to discuss the current status of the Fescue Endophyte Testing Program (which falls under the Seed Section) and plan for future activities. The Laboratory Research Specialist updated the website, submission forms, billing procedures, operational procedures, and database, and the lab was reactivated. There were approximately 81 plant and seed samples assayed in 2005. For more precise details, see the full text in the "Seed Section" of the Division annual report.

### **LABORATORY: Fertilizer Bioassays**

In Winter 2005, the Plant Pathologist, Laboratory Research Specialist, and Fertilizer Section Administrator met to discuss the current status of the fertilizer bioassay testing and what would be needed for this program in 2005. This program is designed to spot-test tobacco fertilizer samples for possible herbicide contamination. The Laboratory Research Specialist revised the testing protocol manual, reorganized the greenhouse and laboratory working area, and conducted bioassays on 216 fertilizer samples collected by fertilizer inspectors. For more details, see the full text in the Fertilizer Section of the Division annual report.



### **UPDATE ON PREVIOUS QUARANTINE ISSUE: *Ralstonia solanacearum* Race 3 Biovar 2**

*Ralstonia solanacearum* Race 3 Biovar 2 causes a serious disease of potato and tomato but also affects geraniums, on which it can be moved over great distances on infected propagative material. This particular race/biovar is not known to be established in the United States although a related race/biovar is. Its detection in 2003 and 2004 required regulatory actions, but it was not reported in NC in 2005.

### **UPDATE ON PREVIOUS QUARANTINE ISSUE: Soybean Rust**

Although soybean rust has been listed as a pest of quarantine significance and efforts are made to keep it out of the U.S., USDA APHIS PPQ determined that its arrival naturally was inevitable and no regulatory action would be taken after it was detected in the U.S. Early-detection was determined to be a primary focus so that control and management actions could be initiated in the most timely way. An extensive national monitoring and educational system was established, with NCSU personnel taking the lead in North Carolina by establishing sentinel plots and educating growers and the industry (we were not directly involved with this). Soybean rust was first reported in the U.S. in November 2004. In 2005, soybean rust was reported early in the season in the more southern states but was not confirmed in North Carolina until late October 2005. It was subsequently found in 18 counties. Its late occurrence was expected to have no economic impact on North Carolina this year and is not expected to survive our winters.

## **Regulatory Weed Program**

The purpose of the Regulatory Weed Program is to implement the State Noxious Weed Rules and the Aquatic Weed Control Act of 1991 through the enforcement of quarantines designed to prevent the establishment and premature spread of noxious weeds. Changes in the State Noxious Weed rules, including nomenclature revisions and the addition of Oriental Bittersweet (*Celastrus orbiculatus*) to the State Noxious Weed List, were implemented in 2005. In support of the program, there were seven weed identifications provided to field staff and the general public.

Permits or certificates are required to move regulated articles from regulated areas into North Carolina and from a regulated area in North Carolina to a non-regulated area in the State. There were 16 NCDA&CS PP Form 4 (Application and Permit to Move Plant Pests or Regulated Articles) permits issued covering research and training purposes for 23 species of weeds. There were eight official verifications issued for movement of equipment, wheat straw bales and nursery stock from non-infested locations in the state. There were 185 State Phytosanitary Certificates issued by NCDA&CS personnel for the movement of regulated articles from quarantined counties. The staff Weed Specialist evaluated and approved five Federal permit applications to move Federal Noxious Weeds into North Carolina for research or commercial purposes.

Interaction with other regulatory officials/researchers in the weed science discipline was accomplished through participation in state and regional meetings and conference calls. The NCDA&CS Regulatory Weed Program was represented in meetings with USDA APHIS, North Carolina Exotic Pest Plant Council, the Northeast Cape Fear Giant Salvinia Task Force, and the

North Carolina Aquatic Weed Control Council. The Weed Specialist provided training on the biology and identification of Tropical Spiderwort and Giant Salvinia for agency personnel. Program guidelines and information, including slides, brochures, and responses, were provided upon request to agency personnel and the general public.

### **Aquatic Plant Dealer Program**

The Plant Industry Division is responsible for field implementation of the Aquatic Weed Control Act of 1991. This Law and accompanying rules restrict the importation, sale, use, culture, collection, transportation, and distribution of noxious aquatic weeds. All in-state aquatic plant dealers are requested to register with NCDA&CS to facilitate the plant inspection program. There were 342 aquatic dealers registered with dealer inspections conducted throughout the year. No aquatic noxious weed detections were reported at aquatic plant dealers in 2005.

### **Witchweed Program**

The Federal Noxious Weed, Witchweed (*Striga asiatica*), a selective parasitic weed, was first detected in North Carolina in 1956. A USDA Program was launched in 1957 to isolate and eradicate the weed pest. Effective October 1995, the NCDA&CS assumed responsibility as lead agency for the project.

Originally, 357,217 acres in North Carolina were infested with Witchweed. Progress in the eradication program has reduced the infested area to 2,097 acres. In 2005, a cumulative total of 4,315 acres was treated in the eradication effort. Of this acreage, NCDA&CS sprayed 278 acres under spray contracts. Remaining acreage was treated by NCDA&CS personnel or by farmers. In aggregate, 10,364 acres were surveyed and monitored during the season to assess control treatments applied, and Witchweed was detected on 1,447 acres. Approximately 13,860 acres were surveyed as a part of the detection/delimiting survey, and Witchweed was found on 45 acres. Released acreage surveys were conducted on 38,987 acres, and Witchweed was detected on 228 acres or about 0.6 % of the acreage. In addition, NCDA&CS Plant Protection Specialists conducted surveys in counties fully released from quarantine status, and no Witchweed was detected in these surveys.

The NCDA&CS' Weed Regulatory Program maintained and updated all Witchweed data submitted from field staff in North and South Carolina.

### **Purple Loosestrife Project**

Purple Loosestrife (*Lythrum salicaria*) is a Class B State Noxious Weed. Because of its attractive flowers it has been planted as an ornamental, but it has proven to be an aggressive invader of wetlands, where it displaces native species and destroys wildlife habitat. Eradication efforts continued with Purple Loosestrife at several locations throughout the state during 2005. Eradication and monitoring efforts were conducted at the following locations and will continue in 2006:

**Winston-Salem (Forsyth County):** Treatments continued at this 15+ acre infestation located southeast of Winston-Salem. Beginning in June 2005 and continuing in July and September,

individual Purple Loosestrife plants were sprayed with a backpack sprayer or ATV-mounted sprayer with a 2% solution of Garlon 3A plus surfactant. Additionally, approximately 10 acres were broadcast sprayed with 2% Garlon 3A herbicide (triclopyr) using a Jeep-mounted sprayer in July and September. Field surveys detected no new infestations. All plants found in 2005 were treated with herbicide or rogued and destroyed.

**Wallburg (Davidson County):** Duke Power Company personnel reported a one-acre site on a right-of-way in August, 1999. The plants were well established on the right-of-way and on the banks of an adjacent farm pond. In 2005, the infestation at this site was much reduced as a result of control action initiated in 1999 and continued annually. Individual Purple Loosestrife plants at this site were rogued or spot sprayed with 2.0% Garlon 3A in June and September 2005.

**Grifton (Pitt County):** Purple loosestrife was detected by NCDA&CS personnel on the margins of two ponds in the Indian Trails subdivision in July 1999. No plants were found at this site in 2005.

**Spruce Pine (Mitchell County):** This site of about 0.1 acre was surveyed in July and August, and the eight plants found there were sprayed with 2% Garlon 3A herbicide.

**Boone (Watauga County):** NCDA&CS personnel monitored this site on the margins of Bass Lake at Moses Cone Park on the Blue Ridge Parkway and treated the plants with Rodeo herbicide.

**Plymouth (Washington County):** The site is on a Norfolk Southern Railroad right-of-way. In June 2002, the site was broadcast-sprayed with 2% Garlon 3A, using an ATV-mounted sprayer. Six plants detected at the site in 2005 were rogued and destroyed.

**New River (Onslow County):** A new Purple Loosestrife infestation was detected in July 2002, on a power line right of way in northwestern Onslow County, near the New River bridge on Highway 24, and control treatments were begun that year. Plants were rogued and destroyed at the 0.5 acre site in June 2005, and the entire site was sprayed with 2% Garlon 3A herbicide using a Jeep-mounted sprayer in September 2005.

**Pikeville (Wayne County):** A new Purple Loosestrife infestation was detected in a flower garden in Pikeville in 2004. The site was broadcast-sprayed with 2% Garlon 3A using an ATV-mounted sprayer in July, 2004. No plants were found at this site in 2005.

### **Purple Loosestrife, Mile-a-Minute Weed, and Oriental Bittersweet Survey in Western North Carolina**

Visual surveys for Purple Loosestrife and the Federal Noxious Weed, Mile-a-Minute Weed (*Polygonum perfoliatum*) were conducted in western North Carolina in Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Haywood, Iredell, McDowell, Madison, Mitchell, Polk, Rutherford, Surry, Watauga, Wilkes, Yadkin, and Yancey Counties. Two Mile-a-Minute Weed plants were detected in container grown hostas in a nursery in Wake County in 2000, but the weed is not known to exist otherwise in North Carolina. No Mile-a-Minute Weed was detected in western North Carolina in 2005. Scattered

new Purple Loosestrife infestations consisting of ten or fewer plants each were found in Alleghany, Ashe, Mitchell, and Watauga Counties, and all Purple Loosestrife plants found were treated with herbicide or rogued and destroyed. Monitoring of these sites will continue in 2006. Oriental Bittersweet was found in the following counties in western North Carolina: Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Haywood, Madison, McDowell, Mitchell, Watauga, Wilkes, and Yancey.

### **Orobanche Project**

Monitoring and eradication efforts continued on an infestation of the Federal Noxious Weed, Clover Broomrape (*Orobanche minor*), in Mitchell County. The infestation persists at the hayfield on the Frank Griffith property and at roadside sites near Bakersville. Additional visual survey in Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Haywood, Iredell, McDowell, Madison, Mitchell, Polk, Rutherford, Surry, Watauga, Wilkes, Yadkin, and Yancey Counties resulted in no other *Orobanche* detections. Monitoring and control efforts will continue in 2006.

### **Tropical Soda Apple**

Surveys continued at sites where the Federal Noxious Weed, Tropical Soda Apple (*Solanum viarum*), was first detected in 1995 (Martin's Abattoir and Wholesale Meats near Godwin, in northern Sampson County) and in 1998 (Coharie Farms in southwestern Sampson County). Two surveys were conducted during high risk periods during the season, encompassing 2,020 acres in aggregate. Fourteen plants were rogued and destroyed at the Martin's Meats site, and none at the Coharie Farms site. Survey and monitoring of both sites will continue in 2006. Detection surveys for Tropical Soda Apple continued throughout the state at sites where veterinary certificates indicated livestock were introduced from Florida. No Tropical Soda Apple was found at any of these sites. Surveys also were conducted in Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Haywood, Iredell, McDowell, Madison, Mitchell, Polk, Rutherford, Surry, Watauga, Wilkes, Yadkin, and Yancey Counties in western North Carolina, with no finds of Tropical Soda Apple.

### **Puncturevine**

The 6.0-acre site in Chowan County where the Class B State Noxious Weed, puncturevine (*Tribulus terrestris*), was detected in 1997 was surveyed in 2005 in May, and no Puncturevine plants were found. Monitoring of the site will continue in 2006.

### **Giant Salvinia**

Giant Salvinia (*Salvinia molesta*), a Federal Noxious Weed, was detected at an aquatic nursery's display at the North Carolina State Fair in 1998, and subsequent surveys by NCDA&CS, North Carolina Department of Environment and Natural Resources (NCDENR,) and NCSU personnel have resulted in detections in 26 counties in North Carolina. Most of these infestations have been eradicated. However, in September 2000, naturalized infestations of Giant Salvinia were detected in golf course ponds in New Hanover County and in a canal and wetland at the Riverbend subdivision near Burgaw in Pender County. Acting under the authority of the Aquatic Weed Control Act of 1991, NCDENR Water Resources personnel

began eradication treatments at these sites in November 2000. Survey of the Northeast Cape Fear River and adjacent wetlands at the Pender County site yielded no new finds of Giant Salvinia in 2005. Survey and monitoring of all sites will continue in 2006. A biological control program for Giant Salvinia at the Pender County site was initiated in 2004, with two releases of the Salvinia Weevil (*Cyrtobagous salviniae*) in June and September. Observations throughout 2005, confirmed the successful overwintering and survival of the Salvinia Weevil in Pender County. Agency personnel participated in the Northeast Cape Fear Giant Salvinia Task Force, which was organized in 2002.

### **Benghal Dayflower or Tropical Spiderwort**

Benghal Dayflower or Tropical Spiderwort (*Commelina benghalensis*) is a Federal Noxious Weed and Class A State Noxious Weed. It was detected for the first time in North Carolina in 2001, at the Cherry Research Farm in Wayne County, where herbicide trials were being conducted. In 2003, the Tropical Spiderwort Advisory Committee was established to develop containment and eradication plans. Intensive survey by NCDA&CS personnel in 2003, 2004, and 2005, detected infestations of Tropical Spiderwort in a total of 26 fields at the Cherry Research Farm, and the infestations were delimited and mapped with GPS equipment. Fumigation of infested fields began in 2004, and continued in 2005, with a total of 180 acres fumigated. Extensive surveys for this species in eastern North Carolina in 2005, resulted in new detections at the Tidewater Research Station at Plymouth, the NCSU Horticultural Field Laboratory in Raleigh, and Martin's Meats Abbatoir in Sampson County. These new sites were fumigated with methyl bromide. Single Tropical Spiderwort plants were also found at nursery dealers in Garner and Clinton, and two plants were found at a nursery in Brunswick County. All these plants were destroyed.

### **Support Operations**

The NCDA&CS Support Operations Facility is located on the Dorothea Dix Campus. Present staff includes four full time and three temporary employees. The Support Operations Unit is responsible for supplying and maintaining vehicles, equipment, and trucks for each program. Additionally, Support Operations personnel are frequently required to assist in the implementation of field activities as requested. The Support Operations Unit provides maintenance on over 120 vehicles, 25 Gators, mules Polaris and Artic ATVs, 48 trailers and tractors. The Support Operations Unit also provides ongoing maintenance for the NCDA&CS BIL, NCDA&CS Plant Industry Crossnore Station, NCDA&CS Blue Ridge Road Greenhouse, and the Old Health Building.

Support Operations activities for 2005 included the following:

1. Gypsy Moth Program-Personnel conducted aerial spray treatments in the Burke County area as well as assisting with spray treatments in the remainder of the state. Staff members assisted with survey and detection activities through out the state. Staff also provided trucks, equipment and supplies for temporary personnel.
2. Boll Weevil Eradication Program-All traps and supplies were warehoused at the Support Operations Unit and distributed to program contractors. Support Operations staff provided vehicles, supplies and equipment to quality control personnel. Staff also assisted with the boll weevil survey during the fall of 2005.

3. Sweetpotato Weevil Program-Staff provided direct support for full time and temporary personnel responsible for placing over 10,000 traps. Staff provided vehicles, supplies and equipment for temporary personnel.
4. Plant Conservation Program-Numerous activities were conducted with the Plant Conservation Program. Support Operations staff members assisted with site preparation for prescribed burns, habitat restoration, prescribed burns, surveys and debris removal. During July, three staff members attended wildland firefighter training to better support program needs for this section of the division.
5. Division Safety-Based on new departmental policies, members of the Support Operations staff evaluated numerous options and helped steer the Division Safety Committee on the most beneficial format to present effective safety training to meet the needs and goals of the Department. New methods of Aerial Application Safety Practices were evaluated and implemented as well.

Support Operations staff also assisted with or supported other programs. These included surveys and/or treatments for Giant Salvinia, Imported Fire Ant, Itchgrass, Purple Loosestrife, Tropical Soda Apple and Tropical Spiderwort.

Members of the staff were active in the planning stages for renovations to the Old Health Building and will continue to be active through the actual construction phase over the next year. These renovations will cause parts of the seed lab to move their processes to the NCDA&CS Greenhouse on Blue Ridge Road.

Several programs require specialized equipment prepared by Support Operations staff. The staff members at Support Operations are frequently called on to make modifications to equipment.

## SEED SECTION

The Seed Section of the Plant Industry Division continues to serve three main functions, all related to the sale of quality seed in North Carolina. (1) A regulation inspection program, (2) seed testing laboratory to test for quality factors including purity, germination, TZ and other related tests, and (3) a seed pathology program to provide seed health services.

The Seed Board has the responsibility to arbitrate issues when farmers and other seed consumers allege that seed have not performed as labeled or warranted. There were a total of five seed complaints that were resolved before arbitration in 2005. Members of this board, appointed by the Commissioner of Agriculture, are as follows: W. A. Dickerson, NCDA&CS, Chairman; Eddie Martin, NCDA&CS (Alternate); Larry Wooten, farmer; Peter Daniel, farmer (Alternate); Taylor Jeffreys, North Carolina Seedsmen's Association; Sam Lee, North Carolina Seedsmen's Association (Alternate); Dr. Janet F. Spears, North Carolina Cooperative Extension Service (NCCES); Dr. Randy Weize, NCCES (Alternate); Dr. Todd Wehner, North Carolina Agricultural Research Service (NCARS), and Dr. Douglas Sanders, NCARS (Alternate).

### Seed Inspection

North Carolina Seed and Fertilizer Inspectors inspected agricultural, lawn turf and vegetable seeds at retail and wholesale seed dealers. 4,149 Seed Dealer's License were issued in 2005. Seeds are checked for compliance to labeling requirements and quality standards of the North Carolina Seed Law. Seed and Fertilizer Inspectors collected 2,337 official seed samples from the 36,023 seed lots inspected. A total of 106 stop sale orders were issued for non-compliance with the North Carolina seed standards and additional 1,208 stop sales were resolved on sight. The total stop sales amounted to 1,314 by inspectors and another 234 issued by the seed lab after quality tests were run.

The cooperative program with NCSU was continued by collecting samples from 46 lots of flue-cured tobacco seed for planting the grow-outs in the NCSU variety verification program. One seed lot of tobacco was found to be a mixed variety and this lot of seed was placed on Stop Sale. All other seed lots that were tested were found truthfully labeled as to variety and recommended to be offered for sale by the Tobacco Seed Committee. The committee is made up of Dr. Steven Leath, Director, NCARS, Chairman; Dr. W.K. Collins, NCARS; Dr. David Smith, NCSU; David Blalock, farmer; David Davenport, seedsman; R. J. Raynor, producer, and Eddie Martin, NCDA&CS.

Seed and Fertilizer inspectors sampled 300 seed lots used on North Carolina Department of Transportation (NCDOT) highway projects. The sampling and testing of these seed lots are vital to NCDOT's seed quality assurance program. One hundred and eight (108) of the lots submitted for testing for NCDOT were stopped in the laboratory for violations of the North Carolina Seed Law and Regulations. Those not in compliance with the NCDA&CS and NCDOT minimum standards were rejected for use by NCDOT. Additional service samples were tested for NCDOT also.

## **Seed Testing**

The Seed Testing Laboratory has dual roles of providing seed testing support for the regulatory program and seed quality data for North Carolina seed dealers, seed producers, farmers, university researchers and other seed consumers. Seed producers and dealers use seed testing data to make management decisions about seed stocks and for labeling purposes. The laboratory received 7,640 service seed samples and 2,337 regulatory samples for testing. A total of 13,311 individual tests were conducted on these samples. Routine tests provide purity (including noxious weed seed examination) and germination information. Special tests include seed lot vigor and variety purity information. Other special tests include: tetrazolium, accelerated aging, cool test of cotton, cold test of hybrid corn, phenol, Roundup Ready tolerance, sand, and moisture testing. These special tests amounted to 429 official and 524 service. The Laboratory has provided special testing for phytosanitary certificates required for the exportation of seed lots.

The Seed Laboratory is an active member of the Association of Official Seed Analysts. Rule changes and new research are presented and discussed. Rules are voted on and become part of accepted procedure.

The Laboratory is in the process of developing a new computed program for reporting the testing and tracking of seed samples in the laboratory. This is a very complex process, which requires the building and updating of several new databases as well as addressing the future of data collection and reporting.

## **Education**

Every year our Plant Industry Division has the opportunity to share our knowledge and expertise with others. We entertain many international visitors with visits and tours. Our Seed Lab is a popular attraction for all visitors. We also had the opportunity to teach four classes at NCSU to agricultural and horticulture students on seed production, seed testing, and seed pathology. Other exhibits included the Southern Farm Show in Raleigh, and the Corn, Soybean, and Small Grain Association Convention in New Bern.

## **Biotechnology**

The Seed Section has the responsibility for the biotechnology issues within Plant Industry. This responsibility includes reviewing the permits issued by USDA for field tests of genetically engineered crops. The Seed Section had reviewed and approved 91 GMO permits in 2005. This also included helping over seeing and approving GMO research on the NCDA&CS research units across the state and Ventria Bioscience's GM rice production in Plymouth.

## **Tall Fescue Endophyte Testing Service**

The Tall Fescue Endophyte Testing Service resumed in January of 2005, after a hiatus due to the loss of personnel. The Service is now being conducted by the Plant Protection, Plant Pathology Laboratory. The webpage was updated and the submission form made fillable and printable online. Also, the Tall Fescue Endophyte Brochure was made available for download as a PDF



file. These changes to the website have generated new and far-reaching interest in the testing service, resulting in a significant increase in samples submitted.

The Tall Fescue Endophyte Testing Service processed a total of 79 samples in 2005. Of that number, 52 were pasture samples, meaning that fescue or perennial ryegrass tillers were submitted for microscopic examination for the presence or absence of the endophyte fungus. Pasture samples were submitted by homeowners, veterinary clinics, extension agents, university personnel, and corporate sources. These samples originated from North Carolina, Colorado, Florida, Maryland, Ohio, Oklahoma and Virginia.

The remaining 27 samples were seed samples of which 18 were official samples, or those submitted by NCDA&CS Seed and Fertilizer Inspectors. Of the remaining nine samples, eight were submitted from a seed production company in Sweden and 1 from a private individual.

## **FERTILIZER SECTION**

The Fertilizer Section implements the North Carolina Fertilizer Law, the North Carolina Agricultural Liming Materials and Landplaster Act, and the North Carolina Soil Additives Act. The overall goal of the program is to assure consumers, distributors, and manufacturers of the quality of fertilizers, agricultural liming materials, landplaster, and soil additives in the channels of trade in North Carolina. To accomplish this goal, Fertilizer Section staff randomly sample fertilizer and lime to (1) assure products in the marketplace are true to grade, (2) enforce labeling requirements, and (3) test for potentially contaminated products. We have streamlined the section by combining the duties of the seed and fertilizer inspectors. These employees have been cross-trained and are now implementing both the seed and fertilizer regulatory field inspections. In FY 2005, penalties totaling \$256,803 were assessed on fertilizer and lime in North Carolina. Also during the year, 81 'Stop Sale, Use, or Removal' orders were issued on fertilizer and lime in North Carolina. The following information summarizes the different parts of the program and accomplishments of FY 2004-2005.

North Carolina farmers and other users of fertilizer and lime experienced a late but normal season during 2005. The use of lime slightly decreased approximately 8%. Fertilizer tonnage decreased slightly by 1% during the 2004-2005 planting season. The North Carolina fertilizer industry is still facing competition from animal waste products and higher pricing due to rising gas costs.

### **Fertilizer Bioassay Program**

The Fertilizer Bioassay Program received 216 samples in 2005. Samples were taken by Fertilizer Inspectors and ground for testing by the Feed and Fertilizer Analysis Lab with the Food and Drug Division. Of the total number of samples, 212 were routine samples and 4 were complaints. All samples were negative for herbicide contamination.

Tables 1 and 2 on the following page indicate data of fertilizer samples analyzed and liming materials and landplaster samples analyzed for FY 2005 compared to the previous four years.

## Fertilizers

Table 1: data of fertilizer samples analyzed for the 2005 fiscal year compared to the previous four years

<b>FERTILIZER SAMPLING AND TONNAGE</b>						
<u>Year</u>	<u>#Samples</u>	<u>#Compliant</u>	<u>%Compliant</u>	<u>Tonnage Reported</u>	<u>Tonnage Sampled</u>	<u>%Sampled</u>
2004-05	2,662	2,065	77.57	1,400,426	44,352	3.17
2003-04	2,773	2,019	72.81	1,591,225	50,458	3.17
2002-03	3,468	2,621	75.58	1,399,516	299,488	21.39
2001-02	3,476	2,743	78.90	1,300,706	71,017	5.45
2000-01	3,256	2,542	78.07	1,966,197	64,065	3.26

## Liming Materials and Gypsum (Landplaster)

Table 2: data of liming material and landplaster samples reported for FY 2005 compared to the previous four years

<b>LIME SAMPLING AND TONNAGE</b>						
<u>Year</u>	<u>#Samples</u>	<u>#Compliant</u>	<u>%Compliant</u>	<u>Tonnage Reported</u>	<u>Tonnage Sampled</u>	<u>%Sampled</u>
2004-05	1,114	959	59.16	784,620	60,885	7.76
2003-04	719	613	85.26	787,186	31,793	4.04
2002-03	770	618	80.26	695,564	112,286	16.00
2001-02	823	714	86.76	1,032,178	39,826	3.85
2000-01	1,143	982	86.00	1,044,009	58,919	5.64

Liming material and landplaster tonnage reported in North Carolina decreased by 12% during FY 2005 as compared to 2004.